Claims

1. Method for implementing transmission antenna diversity in a mobile communications system, which includes at least two receiving units (MS, 701) and at least one transmitting unit (BS, 700), wherein there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which mobile communications system the receiving unit (MS, 701) and the transmitting unit (BS, 700) are in data transmission connection with one another over a radio path, in which method

broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS, 700),

the optimum transmission antenna route is chosen with the aid of broadcast signals in the receiving unit (MS, 701) ,

the chosen transmission antenna route is made known to the transmitting unit (BS, 700),

user data is transmitted through the transmission antenna route connected for use from the transmitting unit (BS, 700),

characterised in that in the method

in the transmitting unit (BS, 700) data is produced in the broadcast signal of each transmission antenna route which individualises the transmission antenna route (44, 45, 46; B1, B2, B3, B4),

an identification is made in the receiving unit based on the data included in the broadcast signal to find out from which transmission antenna route each broadcast signal was transmitted,

based on the received antenna route choice message, the transmission antenna route is connected individually to each receiving unit.

2. Method as defined in claim 1, characterized in that to identify the transmission antenna route, an individual emission of the connected transmission antenna route is added to the user data signal to be transmitted.

3. Method as defined in claim 2, characterized in that the connection of the transmission antenna route is checked in the receiving unit (MS, 701) based on the individual emission added to the user data signal.

4. Method as defined in claim 3, characterized in that to check the connection of the transmission antenna route

the individual emission of the transmission antenna route connected for transmission is compared with the signal shaping method of the chosen optimum transmission antenna route.

5. Method as defined in claim 4, characterized in that

statistics are made on how the connection of the transmission antenna route matches the chosen optimum transmission antenna route, and

the transmitting unit (BS, 700) is notified, when matching in terms of quantity falls short of a pre-established threshold value.

6. Method as defined in claim 5, characterized in that in the message to the transmitting unit (BS, 700) the transmitting unit is controlled to choose a pre-established transmission antenna route.

7. Method as defined in claim 4, characterized in that the transmission settings of the signal are changed in the transmission of the next antenna route choice message, if the connection of the transmission antenna diversity differs from the chosen optimum transmission antenna route.

8. Method as defined in claim 7, characterized in that the next signal including an antenna route choice message is transmitted with a higher transmission power.

9. Method as defined in claim 7 or 8, characterized in that the next antenna route choice message is coded with better channel coding.

10. Method as defined in claim 4, characterized in that the channel estimate of the chosen optimum transmission antenna route is used for breaking up the received user data, and

the connected transmission antenna route is established as the chosen optimum transmission antenna route, when these routes are different from each other.

11. Method as defined in claim 1 or 2, characterized in that the transmission of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual frequency offset.

12. Method as defined in claim 1 or 2, characterized in that the transmission of each transmission antenna route (44, 45, 46; B1, B2, B3,

B4) is shaped by an individual signal shaping method, which is an individual hash code symbol pattern.

13. Method as defined in claim 1 or 2, characterized in that the transmission of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual hash code.

14. Method as defined in claim 1 or 2, characterized in that the transmission of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, wherein on different antenna routes the signal is modulated by a different number of hash codes in parallel.

15. Method as defined in claim 1 or 2, characterized in that the transmission of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual channel coding.

16. Method as defined in claim 1 or 2, characterized in that for each transmission antenna route (44, 45, 46; B1, B2, B3, B4) an individual signal shaping method is established, which is orthogonal in relation to the signal shaping method of the other transmission antenna routes.

17. Method as defined in claim 1, characterized in that broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS, 700), so that the broadcast signals of the different transmission antenna routes include at least one information part which is the same.

18. Method as defined in claim 17, characterized in that broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS, 700), so that the information part is the same in the broadcast signal of the different transmission antenna routes .

19. Method as defined in claim 1, characterized in that broadcast is transmitted through each transmission antenna route 44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS, 700), so that the broadcast signal is divided between the different transmission antenna routes.

20. Method as defined in claim 1 in a mobile communications system, wherein there are at least two receiving units (MS) and at least two

transmitting units (BS1, BS2, BS3) simultaneously in data transmission connection with each other over a radio path, characterised in that based on the broadcast signals of the transmitting units (BS1, BS2, BS3) a choice is made in unit (MS) of the optimum transmission antenna route combination, which includes one transmission antenna route of each transmitting unit (BS1, BS2, BS3) .

21. Method as defined in claim 1 in a mobile communications system, wherein there are at least two receiving units (MS) and at least two transmitting units (BS1, BS2, BS3), characterised in that based on the broadcast signals of the transmitting units (BS1, BS2, BS3) a choice is made in unit (MS) of the optimum transmission antenna route.

22. Method as defined in claim 1, characterized in that an antenna route choice message is coded for transmission to the transmitting unit (BS, 700).

23. Method as defined in claim 1 in a mobile communications system, where in the transmitting unit (BS, 700) there are at least two transmission antenna branches (44, 45, 46), in which method

broadcast is transmitted from each antenna (ANT1, ANT2, ANT3) of the transmission antenna branch of the transmitting unit (BS, 700)

based on the broadcast signals a choice is made in the receiving unit (MS, 701) of the optimum transmission antenna branch,

the chosen transmission antenna branch is made known to the transmitting unit (BS, 700),

user data is transmitted from the transmitting unit BS, 700) through the transmission antenna branch connected for use,

characterised in that in the method

in the transmitting unit (BS, 700) such data is produced in the broadcast signal of each transmission antenna branch which individualises each transmission antenna branch (44, 45, 46)

an identification is made in the receiving unit (MS, 701) based on the data included in each broadcast signal, to find out from which transmission antenna branch the broadcast signal was transmitted,

based on the received antenna choice message, a transmission antenna branch is connected individually to each receiving unit

independently of the transmission antenna branches connected to the other receiving units.

24. Method as defined in claim 23, characterized in that

the chosen transmission antenna branch is identified with the aid of the signal shaping method which is individual for the transmission antenna branch,

for identification of the transmission antenna branch, an emission individual for the transmission antenna branch connected for transmission is added to the user data signal to be transmitted, and

based on this emission, the connection of the transmission antenna branch is checked in the receiving unit (MS, 701).

25. Method as defined in claim 1 in a mobile communications system, where in the transmitting unit (BS, 700) there are at least two transmission antenna beams (B1, B2, B3, B4), in which method

broadcast is transmitted from each transmission antenna beam (B1, B2, B3, B4) of the transmitting unit (BS, 700)

based on the broadcast signals, the optimum transmission antenna beam is chosen in the receiving unit (MS, 701),

the chosen transmission antenna beam is made known to the transmitting unit (BS, 700),

user data is transmitted through the transmission antenna beam connected for use from the transmitting unit (BS, 700),

characterised in that in the method

in the transmitting unit (BS, 700) data individualising the transmission antenna beam (B1, B2, B3, B4) is produced in the broadcast signal of each transmission antenna beam,

the data individualising the transmission antenna beam and included in the broadcast signal is identified in the receiving unit (MS, 701),

based on the received antenna choice message, a transmission antenna beam is connected to each receiving unit independently of the transmission antenna beams connected to the other receiving units.

26. Method as defined in claim 25, characterized in that

the chosen transmission antenna beam is identified in the antenna choice message with the aid of the signal shaping method which is individual for the concerned transmission antenna beam,

for identification of the transmission antenna beam, an emission individual for the transmission antenna beam connected for transmission is added to the user data signal to be transmitted, and

based on this emission, the connection of the transmission antenna beam is checked in the receiving unit (MS, 701).

27. Method for implementing transmission antenna diversity in a mobile communications system, wherein a receiving unit (MS, 701) and at least one transmitting unit (BS, 700) are in data transmission connection with each other over a radio path, in which transmitting unit (BS, 700) there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which method

broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS, 700), so that the broadcast signals of the different transmission antenna routes include at least the one same information part ,

the received broadcast signals of each transmission antenna route are estimated in the receiving unit (MS, 701),

based on the broadcast signals, the optimum transmission antenna route is chosen in the receiving unit (MS, 701),

the chosen transmission antenna route is made known to the transmitting unit (BS, 700),

based on the received antenna route choice message, user data is transmitted through the transmission antenna route connected for use from the transmitting unit (BS, 700),

characterised in that in the method

at least one individual signal shaping method is established for each transmission antenna route (44, 45, 46; B1, B2, B3, B4)

the broadcast signal of each transmission antenna route is shaped in the transmitting unit (BS, 700) by a signal shaping method which is individual for each transmission antenna route (44, 45, 46; B1, B2, B3, B4),

the chosen transmission antenna route is identified in the antenna route choice message with the aid of the signal shaping method individual for the concerned transmission antenna route, and

to identify the transmission antenna route, an emission individual for the transmission antenna route connected for use is added to the user data signal to be transmitted.

28. Method for implementing transmission antenna diversity in a mobile communications system, which includes at least two receiving units (MS) and at least one transmitting unit (BS), wherein there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which mobile communications system the receiving unit (MS) and the transmitting unit (BS) are in data transmission connection with each other over a radio path, in which method

broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS) together with an identifier identifying each antenna route,

the received broadcast signals of each antenna route are estimated in the receiving unit (MS),

the optimum transmission antenna route is chosen in the receiving unit (MS) with the aid of the broadcast signals,

the chosen transmission antenna route is made known to the transmitting unit (BS),

user data is transmitted through the transmission antenna route connected for use from the transmitting unit (BS),

characterised in that in the method

based on the received antenna route choice message, a transmission antenna route is connected individually for each receiving unit.

29. Method as defined in claim 28, characterized in that to identify the transmission antenna route, an identifier identifying the transmission antenna route connected for transmission is transmitted among the user data.

30. Method as defined in claim 29, characterized in that in the receiving unit (MS) the connection of the transmission antenna route is checked based on the identifier to be transmitted among the user data.

31. Method as defined in claim 30, characterized in that in order to check the connection of the transmission antenna route

the identifier of the transmission antenna route connected for transmission is compared with the identifier of the chosen optimum transmission antenna route.

32. Method as defined in claim 31, characterized in that statistics are made on the matching of the connected transmission antenna route with the chosen optimum transmission antenna route, and

the transmitting unit (BS) is notified, when in terms of quantity the matching falls short of a pre-established threshold value.

33. Method as defined in claim 32, characterized in that in the message to the transmitting unit (BS) the transmitting unit is controlled to choose a pre-established transmission antenna route.

34. Method as defined in claim 31, characterized in that in the transmission of the next antenna route choice message the transmission settings of the signal are changed, if the connection of the transmission antenna route is different from the chosen optimum transmission antenna route.

35. Method as defined in claim 34, characterized in that the next signal including an antenna route choice message is transmitted with a higher transmission power.

36. Method as defined in claim 34 or 35, characterized in that the next antenna route choice message is coded with better channel coding.

37. Method as defined in claim 31, characterized in that the channel estimate of the chosen optimum transmission antenna route is used for breaking up the received user data, and

the connected transmission antenna route is established as the chosen optimum transmission antenna route, when these routes are different from each other.

38. Method as defined in claim 28, characterized in that the chosen transmission antenna route is made known to the transmitting unit (BS) as implemented by symbol puncturing.

39. Method as defined in claim 29, characterized in that an identifier identifying the transmission antenna route is added to the user data in every transmission time slot.

40. Method as defined in claim 29, characterized in that an identifier identifying the transmission antenna route is added to the user data at least once during the concerned transmission of the transmission antenna route.

41. Method as defined in claim 28 in a mobile communications system, wherein the receiving unit (MS) and at least two transmitting units (BS1, BS2, BS3) are in a simultaneous data transmission connection with each other over a radio path, characterised in that based on the broadcast signals of the transmitting units (BS1, BS2, BS3) a choice is made in the receiving unit (MS) of the optimum combination of transmission antenna routes, which includes one transmission antenna route of each transmitting unit (BS1, BS2, BS3).

42. Method as defined in claim 28 in a mobile communications system having at least two receiving units (MS) and at least two transmitting units (BS1, BS2, BS3), characterised in that based on the broadcast signals of the transmitting units (BS1, BS2, BS3) a choice of the optimum transmission antenna route is made in the unit (MS).

43. Method for implementing transmission antenna diversity in a mobile communications system, wherein a receiving unit (MS) and at least one transmitting unit (BS) are in data transmission connection with each other over a radio path, in which transmitting unit there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which method

broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS),

the received brodcast signals of each antenna route are estimated in the receiving unit (MS),

based on the broadcast signals, the optimum transmission antenna route is chosen in the receiving unit (MS),

the chosen transmission antenna route is made known to the transmitting unit (BS),

based on the received antenna route choice message, user data is transmitted through the transmission antenna route connected for use from the transmitting unit (BS),

characterised in that in the method

to identify the transmission antenna route, an identifier identifying the transmission antenna route connected for use is transmitted among the user data.

44. Method for implementing transmission antenna diversity in a mobile communications system, which includes at least two receiving units (MS, 701) and at least one transmitting unit (BS, 700), wherein there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which mobile communications system the receiving unit (MS, 701) and the transmitting unit (BS, 700) are in a data transmission connection with each other over a radio path, in which method

the chosen transmission antenna route is made known to the transmitting unit (BS, 700),

user data is transmitted through the transmission antenna route connected for use from the transmitting unit (BS, 700) on a connection specific channel,

characterised in that in the method

through each transmission antenna route such an individual emission is transmitted on a connection specific channel which identifies each transmission antenna route,

the received signals of each transmission antenna route are estimated in the receiving unit (MS, 701),

based on the signals of the transmission antenna routes, the optimum transmission antenna route is chosen in the receiving unit (MS, 701), and

based on the received antenna route choice message, a transmission antenna route is connected individually for each receiving unit.

45. Method as defined in claim 44, characterized in that to identify the transmission antenna route, an identifier individual for the transmission antenna route connected for use is added to the user data signal.

46. Method as defined in claim 45, characterized in that based on the individual emission added to the user data signal, the connection of the transmission antenna route is checked in the receiving unit (MS, 701).

47. Method as defined in claim 44 or 45, characterized in that the transmission of the connection specific channel of each transmission

antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual frequency offset.

48. Method as defined in claim 44 or 45, characterized in that the transmission of the connection specific channel of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual hash code symbol pattern.

49. Method as defined in claim 44 or 45, characterized in that the transmission of the connection specific channel of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual hash code.

50. Method as defined in claim 44 or 45, characterized in that the transmission of the connection specific channel of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, wherein on the different antenna routes the signal is modulated by a different number of hash codes in parallel.

51. Method as defined in claim 44 or 45, characterized in that the transmission of the connection specific channel of each transmission antenna route (44, 45, 46; B1, B2, B3, B4) is shaped by an individual signal shaping method, which is an individual channel coding.

52. Method as defined in claim 44 or 45, characterized in that for each transmission antenna route (44, 45, 46; B1, B2, B3, B4) an individual signal shaping method is established, which is orthogonal in relation to the signal shaping method of the other transmission antenna routes.

53. Method as defined in claim 44 or 45, characterized in that on the connection specific channel an individual identifier is transmitted which identifies the transmission antenna route.

54. Method as defined in claim 44 or 45, wherein

broadcast is transmitted through each transmission antenna route (44, 45, 46; B1, B2, B3, B4) of the transmitting unit (BS, 700),

the received broadcast signals of each transmission antenna route are estimated in the receiving unit (MS, 701),

characterised in that in the method

based on the signals of the connection specific channel and the broadcast signals of each transmission antenna route, the optimum transmission antenna route is chosen in the receiving unit (MS, 701).

55. Arrangement for implementing transmission antenna diversity in a mobile communications system, which includes at least two receiving units (MS, 701) and at least one transmitting unit (BS, 700), wherein there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which mobile communications system the receiving unit (MS, 701) and the transmitting unit (BS, 700) are in a data transmission connection with each other over a radio path, c h a r a c t e r i s e d in that the arrangement includes

in the transmitting unit (BS, 700):

broadcasting means (43, 47) for transmitting a broadcast signal through each transmission antenna route, so that information individualising the transmission antenna route is produced in the signals to be transmitted ,

switching means (54) for connecting the individual transmission antenna route to the transmission of user data, and

in the receiving unit (MS, 701):

choosing means (713, 714) for choosing an optimum transmission antenna route based on the received broadcast signals and for notifying the transmitting unit of the choice.

56. Arrangement as defined in claim 55, c h a r a c t e r i s e d in that it also includes in the transmitting unit (BS, 700):

communication means (53) for shaping the user data to be transmitted in such a way that it identifies the connected transmission antenna route.

57. Arrangement as defined in claim 56, c h a r a c t e r i s e d in that it also includes in the receiving unit (MS, 701)

verification means (721) for verifying the transmission antenna route of the connected user data.

58. Arrangement as defined in claim 56, characterised in t h a t it also includes in the transmitting unit (BS, 700)

a control (59) responding to the message of the choosing means of the receiving unit to control the switching means (54) and the communication means (53).

59. Arrangement for implementation of transmission antenna diversity, which arrangement includes a receiving unit (MS, 701) and at least one transmitting unit (BS, 700), which are in a data transmission connection with

each other over a radio path, in which transmitting unit (BS, 700) there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), c h a r a c t e r i z e d in that the arrangement includes

in the transmitting unit (BS, 700):

broadcasting means (43, 47) for transmission of a broadcast signal through each transmission antenna route in such a way that each signal to be transmitted is individually shaped to identify its transmission antenna route,

communication means (54, 53) for connecting the transmission antenna route to the transmission of user data and for shaping the user data to be transmitted in such a way that it identifies the connected transmission antenna route, and

in the receiving unit (MS, 701):

choosing means (713, 714) for choosing the optimum transmission antenna route based on the received broadcast signals and for notifying the transmitting unit of the choice.

60. Arrangement for implementation of transmission antenna diversity in a mobile communications system, which includes at least two receiving units (MS, 701) and at least one transmitting unit (BS, 700), wherein there are at least two transmission antenna routes (44, 45, 46; B1, B2, B3, B4), in which mobile communications system the receiving unit (MS, 701) and the transmitting unit (BS, 700) are in a data transmission connection with each other over a radio path, c h a r a c t e r i s e d in that the arrangement includes

in the transmitting unit (BS, 700):

identification means for transmitting an individual emission on a connection specific channel through each transmission antenna route, so that the emission will identify the transmission antenna route,

switching means (54) for connecting the individual transmission antenna route to the transmission of user data, and

in the receiving unit (MS, 701):

choosing means (713, 714) for choosing the optimum transmission antenna route based on the received signals of each transmission antenna route and for notifying the transmitting unit of the choice.

61. Arrangement as defined in claim 60, characterised in that it also includes in the transmitting unit (BS, 700):

communication means (53) for shaping the user data to be transmitted in such a way that it will identify the connected transmission antenna route.

62. Arrangement as defined in claim 61, characterised in that it also includes in the receiving unit (MS, 701)

verification means (721) for verification of the transmission antenna route of the connected user data.

63. Arrangement as defined in claim 61, characterised in that it also includes in the transmitting unit (BS, 700)

a control (59) responding to the message of the choosing means of the receiving unit to control the switching means (54) and the communication means (53).

64. Traffic channel structure for relaying data from a transmitting unit to a receiving unit over a radio path, which structure includes data to be transmitted, characterised in that the data included in the traffic channel structure has been shaped by a transmission antenna route specific signal shaping method of the transmitting unit.

65. Traffic channel structure for relaying data from a transmitting unit to a receiving unit over a radio path, which structure includes data to be transmitted, characterised in that the traffic channel structure also includes a transmission antenna route specific identifier of the transmitting unit.